

NOVEMBER, 1962
40 CENTS

Communication

HORIZONS



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details on pg 5

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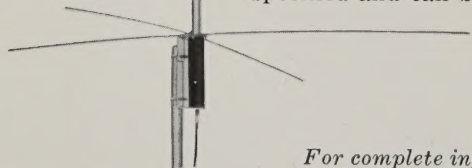
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We ask this for two reasons. One, if you tell us what **you** are doing then we will be able to better serve you by bringing you the information you need. And two, **your** activities, problems, and accomplishments may be news in themselves, helping other people in the industry.

To make it easy for you, we've prepared the card below. Just fill in any of the blanks which may be appropriate, drop it in an envelope, and airmail it to Communication Horizons, P. O. Box 1557, Oklahoma City 1, Oklahoma. Today is the day to do it!

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New test equipment installed: _____

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From: Firm: _____

Location: _____

Signed: _____

Date: _____

NEWS . . . on many fronts of the non-broadcast industry!

During the coming months, the non-broadcast radio industry is expecting to make news on many fronts. Not the least of these is the action to achieve an additional 240 channels of spectrum space by requesting reallocation of UHF TV channels 14 and 15. Technically, too, a number of newsbreaks are being anticipated.

Whatever the event — either technical or administrative — you can count on coverage in depth by the CH team. Washington Bureau Chief Bob Tall, Public Safety Contributing Editor Robert Brooking, Service Editor Kay Reed, and the rest of us here in the main office work around the clock with a single purpose in mind — to keep YOU informed of the latest events in the communication world.

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Communication Horizons published monthly at Oklahoma City, Oklahoma for October, 1962.

1. The names and addresses of the publisher, editor, managing editor, and business managers are: Publisher, Robert B. Cooper, Jr., 4 N.W. 7th St., Oklahoma City; Editor, Jim Kyle, 4 N.W. 7th St., Oklahoma City; Managing editor, Jim Kyle, 4 N.W. 7th St., Oklahoma City; Business manager, Patrick T. Pogue, 4 N.W. 7th St., Oklahoma City.

2. The owner is: (If owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding 1 percent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a partnership or other unincorporated firm, its name and address, as well as that of each individual member, must be given). Horizons Publications, Inc., 4 N.W. 7th St., Oklahoma City; Robert B. Cooper, Jr., 4343 Heyden Lane, Oklahoma City; Robert B. Cooper, Sr., 4343 Heyden Lane, Oklahoma City; Forrest Dismukes, 1425 S.W. 59th, Oklahoma City; Patrick T. Pogue, 2125 S.W. 59th, Oklahoma City.

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4. Paragraphs 2 and 3 include, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting; also the statements in the two paragraphs show the affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner.

5. The average number of copies of each issue of this publication sold or distributed, through the mails or otherwise, to paid subscribers during the 12 months preceding the date shown above was: (This information is required by the act of June 11, 1960 to be included in all statements regardless of frequency of issue.) 1,945.

(s) Patrick T. Pogue

Sworn to and subscribed before me this 13th day of September, 1962.

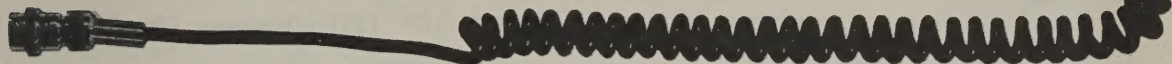
(My commission expires Jan. 12, 1966)

Business Manager

Goldie Winkler

SPLATTER

from JIM KYLE, K5JKX
CH Managing Editor



For three-quarters of a year now, I've been occupying this space on page 1 of each issue with my random thoughts and observations. Sometimes these have been important to me, and other times they have been more on the trivial side.

But as you can tell by glancing over this issue, we have more news — and more advertising. We hope that this happy situation will continue, but if it does it means that the luxury of a full page for me to sound off on must go.

So if next month, or the month after that (or whenever), you find this column missing, it will mean simply that I felt other things more interesting to more of you were available. I may be back, on an intermittent and sporadic basis — but in the future, it will be *only* when I have something to say which I feel is important enough to warrant the space!

By strange coincidence, this month I *do* have something to say which *does* warrant space.

On Monday, October 1, the Land Mobile Communications Section of the EIA filed with the FCC a petition requesting reassignment of TV broadcasting channels 14 and 15 — the two lowest-frequency channels of the much-discussed UHF region — to land mobile service.

This move was the culmination of many months of discussion. A similar petition was planned to be filed nearly a year ago, and was tabled at the last minute. We had to hurriedly kill a story which was already set in type — it was that close!

Obviously, the non-broadcast radio industry is going to find stiff opposition to this move. Not the least of the problems is that the heart of the opposition is going to come from one of the most powerful public-opinion-swaying media in existence today: broadcast television.

It's gratifying to know that, simultaneously with the filing, a nationwide "information" campaign is being launched to try to counter this opposition. Quite possibly many of the arguments used so recently by the TV industry itself to try to block the Commission's desires to put all TV in the UHF region will be revived to

show how this 12 megacycles of spectrum will better serve the public through land mobile use.

But a nationwide campaign is not enough!

Any publicity campaign — call it "propaganda" if you will — which reaches from the top down is doomed to only halfway success. If we are to succeed in getting this additional 12 megacycles, we must also work from the bottom up in convincing the public (that means your friends, your neighbors, and yes, even the people in your town who don't like you) that the frequency transfer is essential *to them*.

How can we do this?

One way not to be overlooked is through direct advertising. I would recommend use of television, with 30-second to 60-second spots. This is not inexpensive, but if properly done can have double effect.

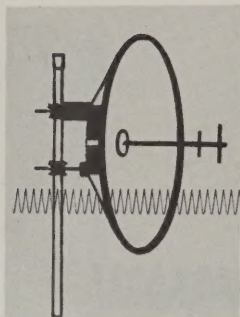
Another route, not so expensive, is through adoption of a few points from the publicity men's books. Many of you are public safety communications officers; many more are service technicians — working on public safety equipment.

Almost all of you have some form of direct contact to — and usually have good relations with — your area's highest public safety officials. Most of these people would like to have additional radio frequency space available.

Tell them about the petition and the expected opposition. Ask them to issue statements for publication. If you can arrange it, get them together with your own TV station's local news department and the result might even be a 15- or 30-minute feature (TV stations usually are looking for good public-service features to fill their own license requirements!) on *your area's* need for additional radio space, and the reasons why such space can't be had.

If you do follow this route, make sure the feature does *not* mention the petition now before the Commission. All you need to do is to convince the public that *more space is needed* (you know this, I know it, but John Q. Man-in-the-street doesn't, yet). Then a week or so later the fact that the petition has been filed can be

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NOVEMBER, 1962

Volume 2, Number 11

Communication

HORIZONS

and "Two-Way Radio Digest" Published Monthly by

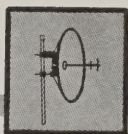
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<i>Managing Editor</i>	Jim Kyle, K5JKX
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<i>Washington Bureau</i>	Robert E. Tall
<i>Service Editor</i>	I. Kay Redd, Jr.
<i>Contributing Editors</i>	Robert E. Brooking Jeremiah Courtney Stanley M. Searle Jean Schaefer Patrick T. Pogue
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OUR COVER:

What may turn out to be the biggest news of 1962 for non-broadcast radio was the October 1 EIA filing with the FCC asking that TV channels 14 and 15 be turned over to Land Mobile services. The cover design by Jean Schaefer symbolizes this news development. Details and the full petition are on page 5.

ADVERTISING

Communication Horizons Magazine accepts commercial display advertising from bona fide manufacturers and distributors of communications equipment and associated apparatus. Advertising rate card and coverage data available upon request. Call collect area code 405 CEnt 2-1108 for advertising information.

CIRCULATION

Communication Horizons Magazine is read monthly by nearly 10,000 two-way communication engineers, technicians, installers and users. Detailed circulation breakdown available upon request.

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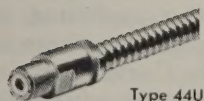
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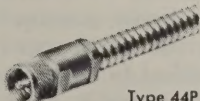
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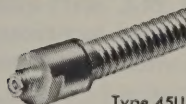
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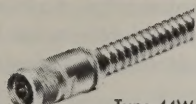
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NMRS

1962 Convention

More National Mobile Radio Service members attended this year's convention (in Washington, September 17 through 19) than ever before in the 14-year history of the association, final attendance tallies showed.

Named president of NMRS for the coming year was A. J. Spooner, of Oklahoma City, Okla., and Liberal, Kan. He succeeded Malcolm Moses, Farmington, N. M.

Elected vice president was Jerry Stover, of Dallas. Ralph Hicks, Tulsa, Okla., was named secretary, and William Nelson, Indianapolis, Ind., was elected treasurer.

Highlights of the meeting included discussions between NMRS representatives and spokesmen for AT&T concerning interconnection policies; an address by Rep. Emanuel Celler, chairman of the house judiciary committee, on monopoly considerations in the communications industry, and a banquet address by FCC Commissioner Robert E. Lee.

The interconnecting talks took place during a closed meeting; no results of the discussions were announced. It is understood that the discussions will continue, on an informal basis, at AT&T's New York City offices.

Rep. Celler reviewed investigations by the anti-trust subcommittee of his group into various monopoly problems. He charged that the 1956 Bell System antitrust consent decree "did violence to antitrust principles" and "was arrived at . . . under most suspicious circumstances".

The New York representative said he felt there was a need for greater "organization" among the radio common carriers. He declared, "It is not enough to assert your rights, you must fight to preserve them."

Commissioner Lee spoke on the frequency spectrum problem. He said he expects to ask the Commission to "draw some guidelines" as to "parity" between safety-special and common carrier services on such points as power limitation, and the like.

He commented that "there is a great deal of spectrum space in the broadcast band(s) that is largely unimplemented." The Commissioner pointed to his "long, lonesome and thus far unsuccessful effort" to transfer all TV broadcasting to the UHF channels and thus free 72 Mc of VHF space for other services.

A number of other speakers at the convention made points important to the RCC industry.

One was Frank Palik, chief of the FCC Domestic Radio Facilities Division, who was the opening speaker of the convention. He told the group that the sometime lengthy delays in FCC processing of applications for common carrier radio authorizations often stems from the failure of the applicants to submit information.

The speed in common carrier radio application processing, or lack of it, has been one of the principal sources of complaint by the radio common carrier operators with the Commission, and Mr. Palik emphasized that the hold-ups in the processing line which sometimes occur are more often than not traceable to the fact that the applicant has not spent enough time and effort in the initial preparation of his request.

It normally requires only a few hours for a common carrier application in good order to be processed, after it has reached the head of the "pending" line, but if deficiencies are spotted at that time, it may take a lengthy time period for correspondence between the Commission and the applicant to iron out the difficulties, he said.

The majority of problems, the FCC official declared, arise in the engineering field, since many common carrier radio applications are submitted to the Commission with a minimal attempt at meeting the Commission's criteria. In some cases, he said, the applicant may be attempting to "get a place" in the application processing line, with the intent to later modify the application to bring it into good order, but such an approach is a "gamble" the applicant is making which rarely pays off.

Some common carrier applicants, Mr. Palik declared, appear to be spending more time in an effort to circumvent the Commission's rules than they are in determining just what they can accomplish in the way of service in conformity with the rules. One such case, he noted, can tie up a substantial number of FCC staff members who would otherwise be devoted to processing applications, and slows the whole procedure.

A number of the applications received by the Commission, Mr. Palik said, reflect the fact that the applicant has not familiarized himself with the latest FCC rule changes in the common carrier field. Often, he said, an applicant may request advice of an engineering or legal nature

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EIA Petition Filed

A petition for 12 additional megacycles of frequency spectrum for the nation's two-way radio communications services was filed Oct. 1 with the FCC by the Land Mobile Communications Section of the Electronic Industries Association.

The petition asks that television broadcasting channels 14 and 15, which occupy the spectrum space from 470 to 482 megacycles, be reallocated to land mobile radio use.

This space is now occupied by only eight television stations across the nation; the plan proposed by EIA contains specific safeguards against interference to these stations, as well as to others now under construction.

Concurrently with the filing of the petition with the FCC, a full-blown effort is being mounted to enlist the full and active support of all public and industrial enterprises in a position to help off-set the expected wave of expressed shock by broadcasting station owners. This effort will present the story of the importance of two-way radio communications to the country, before the FCC, Congress, and general public by the organized efforts of the broadcasters.

The EIA section will note that the 12 megacycles of space being requested is well under the almost 41 megacycles of spectrum for which the land mobile radio field conclusively proved a need in the Commission's recent inquiry into present and future uses of the frequency spectrum between 25 and 890 megacycles.

The EIA section believes substantial growth of the older established radio services since the time of the FCC hearings, and the dramatic examples of public benefit from new services such as local government, business, and manufacturers are full proof that the 12 megacycles of space involved in the request will serve the country better as a multitude of narrow communication channels than as the 81st and 82nd channels of broadcast TV.

Basic in the position of the land mobile radio field is the fact that both the manufacturers and users of nearly two million two-way radio units in the country have been called on to suffer the rigors and financial setbacks of the FCC's numerous "channel splitting" frequency programs, while few other types of users of the spectrum have tightened their belts at all.

It has been established, moreover, that with the exception of one or two of the FCC proceedings now underway, channel splitting has come to a technical halt.

The Federal Communications Commission has protection from interference to existing Channel 14 or 15 TV stations could be laid down by the FCC with the limitation that no mobile radio systems be permitted to operate within 150 miles of such stations.

Radio user organizations throughout the country, as well as non-EIA manufacturers of mobile radio equipment, will be urged to attend a meeting in Washington early next month to discuss the program.

The full text of the petition as filed follows:
Before the

FEDERAL COMMUNICATIONS COMMISSION

Washington 25, D. C.

In the Matter of)
Inquiry into the Problem of)
Additional Frequency Space)
for Land Mobile Services)

PETITION BY THE LAND MOBILE COMMUNICATIONS SECTION OF THE ELECTRONIC INDUSTRIES ASSOC.

This petition is submitted exclusively on behalf of the Land Mobile Communications Section (hereinafter referred to as Petitioner) which is the Section representing the land mobile communications industry within the Industrial Electronics Division of the Electronic Industries Association. The petition is submitted under the authority of Section 4 (d) of the Administrative Procedure Act (5 U.S.C. Section 1003) and Section 1.202, Subpart C of the Rules of Practice and Procedure of the Federal Communications Commission (hereinafter referred to as Commission).

This petition is made for the purpose of affording frequency spectrum relief to the Land Mobile Services and requests that proposed rule making proceedings be initiated pursuant to Section 4 of the Administrative Procedure Act and the Commission's Rules of Practice to effect the following rule change:

Reallocate the frequency spectrum now allocated as TV Channels 14 and 15 to the Land Mobile Radio Services.

Supporting Arguments

Petitioner believes that, in the 1959 hearings on Docket 11997, the Commission was given conclusive evidence that the Land Mobile Radio Services require an appreciable increase in frequency spectrum. In that proceedings, predictions, of future usage by such services based on growth estimates, supported a requirement for an additional 40.8 Mc/s of spectrum by 1968. Shortly prior to the hearings in Docket No. 11997, the Commission in 1958 created several new services in the Public Safety

Colorado Patrol Case Heard

Differences between the State of Colorado and the FCC as to the request of the Colorado State Patrol for waiver of the Commission's rules to permit non-police communications to continue to be handled over the state's police radio service system were outlined in relatively brief form Monday, Oct. 1, before FCC Commissioner Robert E. Lee in an oral argument in Denver.

Colorado assistant attorney general James R. Richards, representing the state, contended that the present radio operations of the state patrol, which are handling communications of other state and local agencies, are not interfering with the two other users of the two frequencies of the patrol's system; that to change the operations along lines suggested by the FCC would result in excessive cost to the state; and that the present operations are in line with the state's budgetary procedures, whereas the Commission's suggested approach is not.

Mr. Richards pointed out that FCC rules do not clearly define what "police activities" actually are, and interpretation of this point should be left up to the licensee. Actually, he said, "the activities for which communications are provided on the radio system are basically law enforcement

functions, and could come within the 'police' classification."

Leonard S. Kolsky, chief of the rules and standards branch of the FCC Public Safety division, stipulated that the only activities remaining on the state patrol radio system with which the commission has objection—some changes have been made since the proceeding was initiated—are fish and game, and highway operations.

Mr. Kolsky pointed out that the commission generally does leave the extra definition of "police" activities up to the licensee, but within "reason", and that the agency has specifically established a local government radio service to enable governmental agencies to set up cross-service radio systems in the public safety field, such as Colorado's.

The FCC attorney agreed that the two frequencies now in use by the Colorado system are not causing undue interference, but noted that a third frequency which has been requested by the state is in use by state police departments in 20 states, some close to Colorado, posing the probability of interference.

The case now goes to the FCC commissioners for decision.

From preceding page . . .

and Industrial Radio Services. These services consisted of the Local Government, Manufacturers, Telephone Maintenance, and Business Radio Services. The substantial growth in the older established services, coupled with the dramatic increase in the relatively new radio services are tangible supporting evidence of the validity of these predictions. It is estimated that the Land Mobile Services may well double in number of stations licensed and transmitters in operation within the next five years.

Many of the individual radio services within the Safety and Special Services group are presently suffering highly crowded conditions that have required stacking as many as 20-30 users on the same frequency in the same area, seriously impairing the effective use of their land mobile radio communications.

Petitioner recognizes that the Commission has proposed making available split channels in the 25-42 Mc/s band in Docket 14503, and in Docket 13847 that the 450-470 Mc/s band be split into 25 Kc/s channels. The low band splits will afford partial relief and improve the present situation, but such action is insufficient for long term growth. When the state of the art permits utilization of the 450 Mc/s split frequencies, this will also help. However, it is becoming increasingly clear that there is no frequency spectrum likely to be available in other frequency bands now in use by the Land

Mobile Radio Services. Channel splitting has been exploited to the limits of the technical art as a ready source of additional spectrum for these services. In its 1961 Annual Report, the FCC underscored this point in the development of the industry when, referring to possible channel splitting, it stated:

"If channel splitting is undertaken in these (Land Mobile) bands, the source of additional frequencies for these services will be exhausted. Thus, serving the ever-increasing demands of growth will require technical proficiency on the part of all users to develop the maximum usage of the available frequencies."

While temporary relief may be afforded by splitting some channels, the extremely crowded conditions can only be remedied on a long term basis through reallocation of frequencies for land mobile use. The reallocation of TV Channels 14 and 15 would afford immediate, as well as future, relief.

It is not practicable to utilize higher frequencies in the spectrum for land mobile use within the foreseeable state of the art; and with the Land Mobile Services presently using equipment in the 450 Mc/s spectrum immediately below TV Channels 14 and 15, it could, therefore, utilize these channels very effectively with no major equipment development requirement.

(Turn to page 18)

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*Exact frequency must be specified

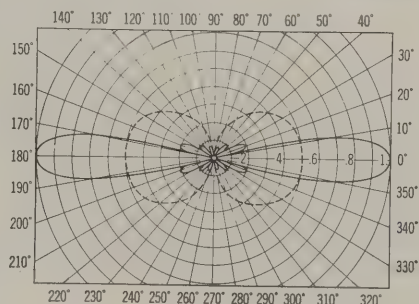
Vertical field strength pattern of Cat. No. 200-509 Stationmaster Antenna. A dipole pattern is shown for reference.

Electrical Specifications:

Nominal input impedance	.50 ohms
VSWR	1.5:1
Bandwidth	±0.3%
Maximum power input	500 watts
Internal feedline	RG-8A/U
Flexible terminal extension	18" of RG-8A/U
Termination	Type N male with Neoprene housing
Omnidirectional gain	144-174 Mc 5.8 db 130-144 Mc 5.5 db
Vertical beam width (½ power points)	18°
Lightning protection	Direct ground

Mechanical Specifications:

Radiating element material	Copper
Element housing material	Fiberglass
Element housing tip diameter	5/8"
Element housing butt diameter	1 7/8"
Element housing length	19"
Ground plane element length	18"
Support pipe	2 1/2" dia. hot-galvanized steel, 22' available for mounting
Rated wind velocity	100 MPH
Lateral thrust at rated wind	45 lbs.
Bending moment 6" below ground plane at rated wind	450 ft. lbs.
Weight	30 lbs.

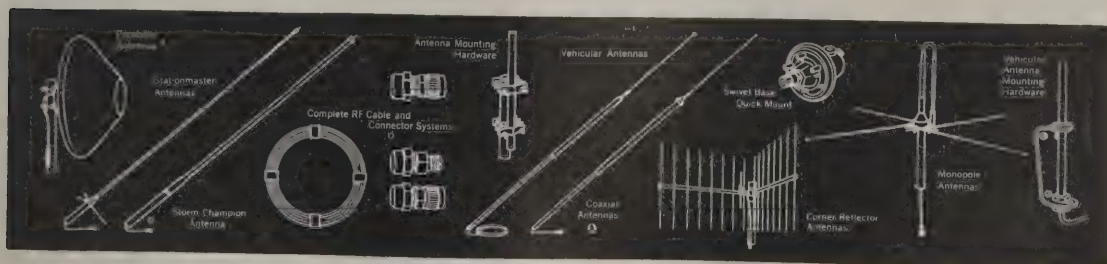


COMMUNICATION ANTENNA SYSTEMS FOR AMERICAN BUSINESS

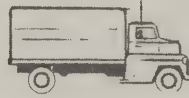
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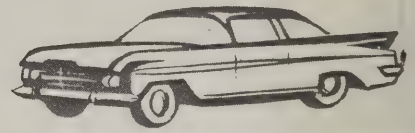
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Servicing Editor



RECEIVER MEASUREMENTS

When most service shops check a receiver's sensitivity, the "20 db quieting" method is used, and the 20 db is usually "measured" by ear. Then if a received signal sounds loud and clear and the squelch works, the receiver is considered to be operating properly. If this is done by an experienced technician, it is probably sufficient in most cases, but in some cases the results will be somewhat erroneous.

Since the receiver is to be used to receive a modulated signal, the sensitivity should be measured while a modulated signal is received, which is the method recommended by EIA and IRE, and by this method *useable* sensitivity is measured. Useable sensitivity is defined by EIA as "the minimum value of the standard test input signal from a standard input signal source which, when modulated at standard test modulation, will produce the receiver's full rated audio power output with 12 db signal + noise + distortion to noise + distortion ratio," or more simply expressed, the "12 db SINAD sensitivity test".

To make this test, a distortion meter will be required, which is a piece of test equipment which normally should be found in every two-way radio shop. This instrument is not as complicated as may be expected. It is merely an audio amplifier with a built-in tone filter. A panel meter measures the amount of audio before it is filtered or after it is filtered.

If a 1000 cps tone is fed into the instrument, the amplitude can be measured (AC VTVM), then the filter is switched into the circuit and tuned to 1000 cps. The remaining audio is measured, in percentage or db difference, which may consist of noise or harmonic distortion (tones other than 1000 cps). A distortion meter which is adequate for SINAD measurements can be bought from Heathkit. (Model HD-1).

Most service shops are already using a signal generator which can be accurately frequency modulated with a 1000 cps tone, such as Measurements Model M560. The Motorola T-1034A is also built by Measurements and will perform similarly. The only other equipment necessary will be a meter to show when the discriminator is at zero.

Now, if you have a receiver that is on frequency and has been properly aligned, a SINAD

measurement is indicated. If the equipment is ready to be used at a bench set-up and was warmed up for about 20 minutes, the measurements can be made in about five minutes as follows:

The signal generator is connected to the antenna jack, the distortion meter or analyzer is connected to the audio output of the receiver, and a voltmeter is connected to the discriminator output. First, the squelch control is turned to minimum (unsquelched) and an unmodulated signal fed in at the proper operating frequency. During the entire test this signal is carefully kept on frequency as indicated by the discriminator meter. At this point the sensitivity can briefly be checked by decreasing the signal to about one microvolt, then increasing to about 1000 microvolts for full limiting action. The 1000 cps tone is then turned on and set for 2/3 rated deviation (3.33 kc for narrow band); after this tone is clearly heard in the loud speaker, a dummy load may be substituted for the speaker.

The output of most mobiles is two watts operating into a 3.5 ohm load. By use of the formula $P=E^2/R$, the voltage output at full power is found to be 2.6 volts. Using the distortion meter as an AC VTVM, the receiver volume control is adjusted to produce full rated output and the control is left at this setting for the rest of the test. With 1000 microvolts of signal, there should be no noise, however distortion may be present and may be checked before proceeding. Distortion should be less than 10%.

Next, the distortion meter filter is turned to the "IN" position and is tuned to 1000 cps as indicated by a null or dip on the meter scale. The signal is then reduced and as it approaches zero, more and more noise plus distortion will accompany the signal. The distortion meter filter is switched "IN" and "OUT" and the point at which noise plus distortion (filter in) is 12 db less than the modulated signal (filter out) is noted.

Now, if the output voltage from the receiver, as read on the AC VTVM, is not less than .5 times the output with 1000 microvolts, then the amount of signal noted above will be the 12 db SINAD sensitivity. If the output is less than .5 the voltage, the signal is increased until .5 the voltage is reached and this will be the 12 db SINAD sensitivity.

Antenna Eliminates Antenna

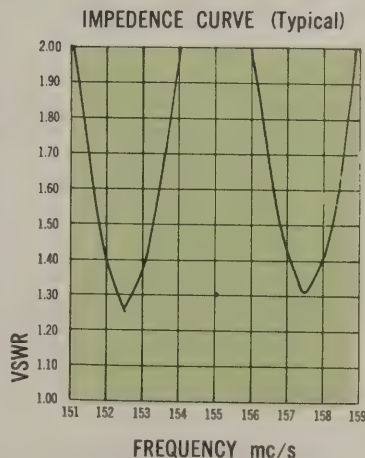


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Here is an ideal antenna for Mobile Telephone Service, mobile repeat, or any full duplex or two-frequency application. Its unique double-dip resonance characteristic enables both receiver and transmitter to deliver optimum performance without compromise — making two separate antennas unnecessary.

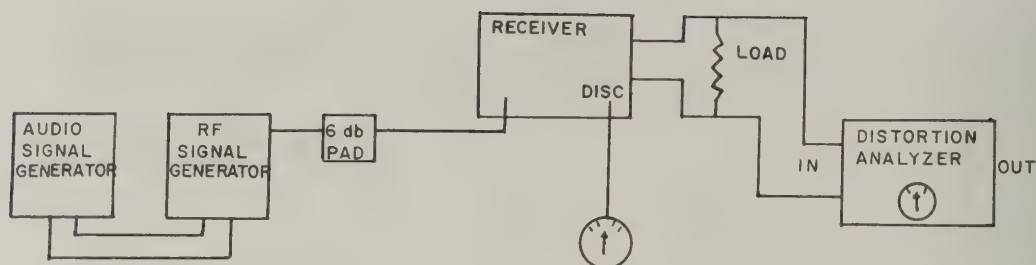
The Omni-6 DD has a 5.8 db gain over a 1/2 wave dipole at two discrete frequencies with nominal 5 to 10 Mc/s spacing in the 144-174 Mc/s band. VSWR is 1.5:1 or less at both frequencies.

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* Double-Dip Resonance

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1000 CYCLE EXTERNAL MODULATION OF
RF SIGNAL OR INTERNAL MODULATION

Receiver set up jig for measurement of sensitivity, deviation and distortion as outlined here.

In general, the sensitivity by this method will be found to be a couple of tenths of a microvolt better than by the 20 db quieting method. If the sensitivity is much worse than the 20 db quieting method, poor bandwidth will probably be indicated. At any rate, when the 20 db quieting measurement is made, the AC VTVM should be used so that 20 db can be accurately measured.

Some technicians check bandwidth by simply moving the signal frequency above and below the operating frequency and listening for noise. This method is simple, but doesn't mean much. The proper method is to measure the modulation acceptance bandwidth, assuming that most service shops do not have an adequate sweep generator.

To measure bandwidth after measuring SINAD sensitivity, increase the signal by 6 db (twice the reading obtained for sensitivity), and increase the modulation of the signal until the 12 db difference with the filter "IN" and "OUT" is reached. The deviation reading on the signal generator is the modulation acceptance bandwidth of the receiver.

A defective discriminator can cause distortion in a receiver. The discriminator output should be measured with no signal into the receiver; the voltage measured (DC) should be a somewhat unstable voltage within a few tenths of a volt, plus or minus, of zero. This measures the general

symmetry and position of the IF filter stages preceding the discriminator.

The discriminator secondary should then be checked for a zero reading with a correct IF signal applied after the second (or last) mixer stage. Next the linearity should be checked by applying a signal five or ten kc higher and lower in frequency than the correct IF frequency. The voltage at the secondary should swing an equal amount from zero as the input frequency is changed an equal amount above or below the correct frequency. If it does not, the discriminator primary should be adjusted until the swing is equal.

After the receiver has passed all of these tests, it should be put on frequency (usually by adjusting the first oscillator) with a frequency standard, then checked against the transmitter it is to receive. If the two frequencies do not agree, it would seem logical that the transmitter in question should be put on frequency, however a lot of service shops think there is nothing greater than "netting a system" which may result in merely setting receivers to transmitters without regard to what frequency the transmitter may be on.

Other receiver tests and adjustments may be recommended by the manufacturer of any particular equipment. Check manufacturer's service data for details of them.

NMRS . . . from p. 4

from someone not qualified to give such counsel, and the advice obtained in this manner is not always a help.

Requests for special temporary authorizations are "snowballing" at the Commission, the Division Chief noted, and in too many cases, no emergency exists to justify the request. This results in delays in the processing of STAs where there are genuine emergencies.

Other FCC officials taking part in the meeting were Industrial Radio Division Chief Daniel H. Arnold, participating in a panel discussion on

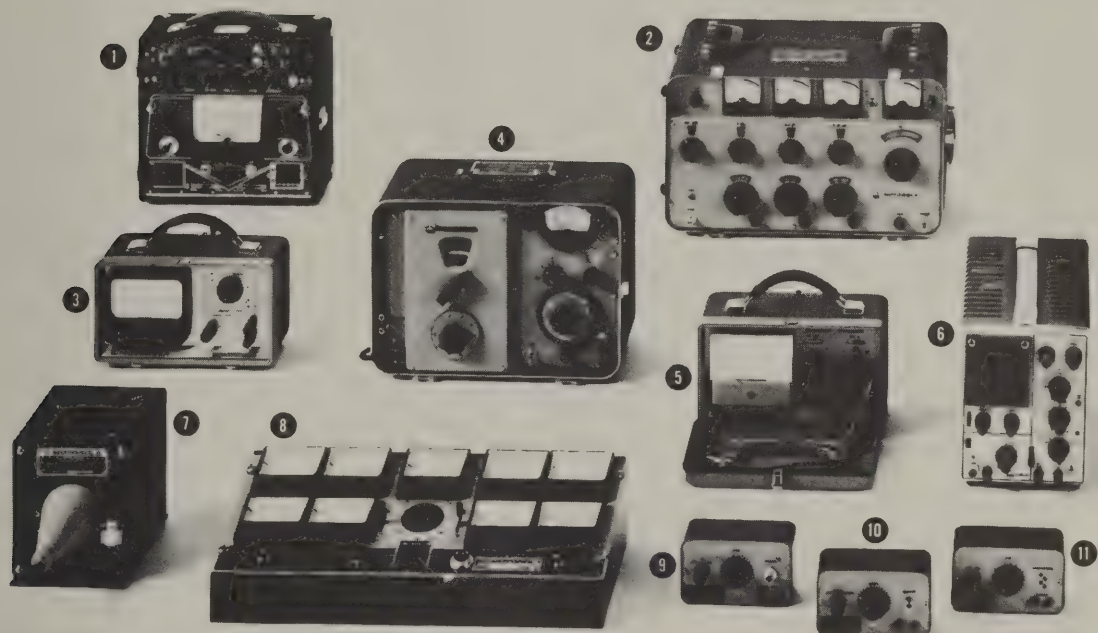
industrial and business radio cooperatives, and Domestic Radio Facilities Division Attorney Byron Harrison, discussing the intertwining responsibilities of the regulator and the regulated in economic growth and development of the RCC industry.

Washington attorneys participating in the sessions included NMRS General Counsel Norman E. Jorgenson, Jeremiah Courtney, W. H. Burghe-sani and Thomas Shack.

From the American Telephone & Telegraph Co., Radio Engineer Peter B. Engh discussed the Bell System's new Bellboy radio paging service,

(Turn to page 14)

MOTOROLA TAKES THE GUESSWORK OUT OF SELECTING PRECISION RADIO COMMUNICATIONS TEST EQUIPMENT



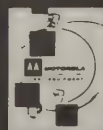
Years of experience and continuous research enables Motorola to provide only the finest quality, precision test equipment that makes the radio communication technician's job easier and faster. Manufactured to the most exacting standards, this equipment fulfills virtually every 2-way radio servicing need. Each unit is carefully designed and built to do specific jobs the right way . . . with utmost accuracy . . . in either shop or field. There is no compromise—no guesswork with Motorola Test Equipment. This is your assurance of getting the most in versatility, performance, economy and service life for your communications dollar.

A few examples of Motorola's wide test equipment line are:

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| 1. Portable Test Set with Peaking Generator and Deviation Meter | 6. Precision Wide Band Oscilloscope |
| 2. Frequency Meter | 7. RF Load Resistor |
| 3. AC Voltmeter | 8. Multi-purpose Transmitter and Receiver Metering Panel |
| 4. FM Signal Generator | 9. Transistorized Pulse Generator |
| 5. DC Multimeter | 10. Transistorized Tone Oscillator |
| | 11. "Private-Line" Tone Generator |



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RADIO COMMUNICATIONS
TEST EQUIPMENT



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PUBLIC SAFETY COMMUNICATIONS

by Robert E. Brooking, Communications Engineer — City of Burbank, California

THE PRICE OF LIBERTY

"The Price of Liberty is Eternal Vigilance." This historic saying is just as true today as it was in the days of our forefathers when it was first uttered. And it applies to many things other than politics, including radio.

No better example is needed than a situation which developed just a few weeks ago. It all began on July 31, 1962, when the Federal Communications Commission released a Notice of Proposed Rule Making to amend Parts 2 and 4 of the Commission's rules and regulations to establish a new class of television service for the transmission of instructional and cultural material to multiple receiving locations on channels in the 1990-2110 Mc or 2500-2690 Mc frequency band (Docket No. 14744).

The announcement was carried in the August 4, 1962, issue of the Federal Register. Not many of us read the Federal Register and in addition, many of us in Public Safety were enroute to the APCO Conference in Clearwater, Florida. Others were on vacation. Thus, it was after Labor Day when word of the Docket reached us.

Thanks to Harvey Platt, President of APCO, and his trusty secretary, a copy of the Notice was received on Sept. 6. There were 11 days left to file, hardly time to develop a good set of comments. Fortunately, E.I.A. obtained a 30-day extension of the filing date. Comments have been filed by various users in Part 10, 11 & 16.

Since eligibility in the proposed new service would be limited to "non-profit educational organizations" and since the majority of such organizations are tax-supported organizations, owned and operated by governmental entities at the city, county and/or state level, the various governmental entities will be the licensees in the majority of cases.

Many governmental entities, faced both with budgets and the problem of finding adequate teaching personnel are looking toward classroom television as a means of solving their problems. In addition, many of these entities are interested in classroom television for the purpose of training Fire and Police personnel; it represents the only logical means of "in service" training in a large department.

These same entities presently operate land mobile radio systems in the various Public Safety Radio Services. Some operate systems in Part 11 and 16. In the large metropolitan areas there is already a shortage of channels in the land mobile services; yet at the same time, Broadcasting presently holds 59% of the radio spectrum between 25 and 890 Mc. Now it is proposed that that another 120 to 190 Mc of spectrum space be added to the TV assignment.

TV is the most profligate user of spectrum space and as such it should *first* use to the fullest extent possible the space already assigned. Remember the paper given by Dick Gifford in which he stated that "in the Land Mobile bands, the allocations have been derived from need"? "In the FM and TV Broadcast bands, they have been derived from someone's idea of what *should* be in the public interest."

Eleven years ago, in 1951, the Federal Communications Commission decided that twelve TV channels were not enough, and so they set aside 420 Mc of the UHF spectrum for 70 additional channels between 470 and 890 Mc.

Today there are 176 stations authorized on these 70 channels of which some are "dark", although they retain their licenses. The Commission, itself, talks of a 30 or 50 channel TV allocation as being adequate. Let us see how adequate it would be.

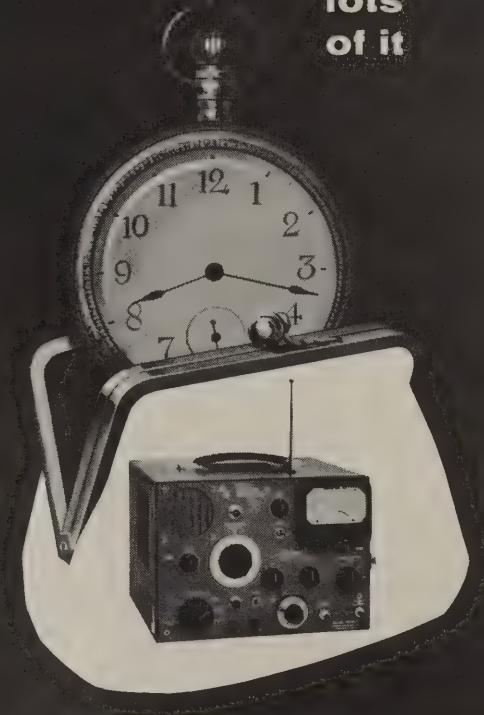
At the present time, the average loading per VHF channel is 43 stations. An all UHF-TV assignment of 50 channels would accommodate 2150 TV stations. There are presently less than 700 TV stations operating in the United States. Thus it becomes apparent that more than enough space is left for future growth. This would still leave 20 channels available in the UHF spectrum for the "new class of educational television service". Let the 20 channels between 770 Mc and 890 Mc be re-allocated for this new service.

At the present time only four TV stations are authorized above 770 Mc and these could be moved to these portions of the spectrum. This would leave the existing microwave assignments untouched to accommodate the tremendous growth in the use of microwave for operational fixed services.

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lots
of it**



HERE'S HOW with the **MCM-5 MULTI-CHANNEL FREQUENCY MONITOR**, calculation, interpolation, and set-up time have been replaced with fast, simple, and accurate operation. Just select the channel—then measure frequency, deviation, or receiver sensitivity. Your specific channels (up to 23 between 25 and 1000 Mc.) are installed in one instrument. Calibration and service of your radio communications equipment ensure not only compliance with F.C.C. regulations, but also improve reliability and provide maximum performance from your equipment. Skilled or unskilled personnel can easily operate the **MCM-5**.

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Almost concurrent with Docket 14744, two other dockets affecting the microwave region were announced: 14712 and 14729. Docket 14712 proposes to reduce the allowable band width to 800 Kc per channel in the 2110 to 2200 Mc band. This would limit the use of frequencies to "thin route" point to point systems; that is, systems up to 24 channels using frequency division multiplex (stackable carrier). Most of the users filing comments have concurred with this proposal; but the paradox is, that while we are proposing to narrow the band width available to each licensee so that more systems can be crowded into these 90 Mc, at the same time another proposal would set aside 120 or more megacycles for a use which at present is highly doubtful and for which necessary space is already available between 770 and 890 Mc.

The National Association of Manufacturers Committee on Manufacturers Radio Use put it nicely in their filing, stating that: "The 20 six-megacycle channels provided in that band (eight more than are available in the VHF band for public television throughout the United States) would seem to be a more than generous allocation for the initiation and exploration of 'this concept of a new class of educational' service. However worthy the objective may be (which we do not disparage in the slightest degree), this 'concept' would not be the first educational device or method that failed to a larger or smaller extent when actual application over a period of time produced disappointing or controversial results."

The question of means for developing the use of UHF-TV has not as yet been resolved. Let us first see a thousand or more TV stations in that band before depriving other services of their bands. To this end, the price of the availability of these portions of the spectrum to us, is continued vigilance at all times. Your entity, your company, your radio system may not be operating a point-to-point microwave system today; however, many are. Ten state governments as well as counties and cities are already using frequencies between 1900 and 2690 Mc. Many other users, power, gas, petroleum, railroads and business enterprises are making use of this portion of the radio spectrum.

However, let us not overlook positive actions. The Land Mobile Communications Section of the Electronic Industries Association is filing a petition with the Federal Communications Commission asking that TV channels 14 and 15 be re-allocated to the land mobile radio services. The petition contains some very compelling arguments. Stated simply, the land mobile services have grown until they must have more space. The transfer of TV Broadcasting from VHF to UHF will still require a number of years even if

a decision is forthcoming. The land mobile services cannot wait that long. The petition would provide for protection to the existing licensees on Channels 14 and 15 by requiring that operation not be permitted within 150 miles of these TV stations. This would provide 12 Mc from 470 to 482 Mc contiguous to the 450-470 Mc land mobile band. This would provide needed space in the presently saturated New York and Los Angeles areas.

Whether the petition will be successful depends largely on the support it receives from the land mobile users.

Too many licensees, both governmental entities and business have assumed that it was only necessary to contact a purveyor of two-way radio equipment and he would take the order, find a channel, obtain the license and put the system on the air.

For those who are naive enough to believe that this is still the case in the large metropolitan areas, please be advised that Mr. Max Guiberson has announced that the Public Safety Communications Council will meet in Chicago on October 25 and 26. Representatives of APCO, ESPRL, FCCA and IMSA will journey from New England, South Carolina, Texas, California and the State of Washington to discuss the problems facing the Public Safety Radio Users. They can be summed up thusly: "How do we crowd more Public Safety Radio Systems into our already overloaded operating space?"

Mr. Guiberson has invited the American Association of State Highway Officials to join the group. Informed sources indicate that AASHO will accept the invitation.

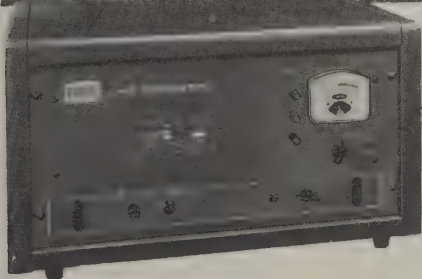
But the big problem remains; getting more space for the land mobile users. Not all of the mobile radio manufacturers were in accord. One company opposed the EIA action; incidentally the same company opposed EIA action on Docket 14229 (see Editorial, January 1962 issue of *Communication Horizons*). There will be opposition. It is up to us to counter this opposition. ■■■

NMRS . . . from p. 10

and Assistant Vice President Hubert L. Kertz took part in a forum on interconnection and regulation aspects of the RCC industry. Western Union Telegraph Co. Assistant Director of Special Services Engineering E. L. Parkington outlined Western Union's broadband switching and microwave system, and other special services of interest to the association members.

The theme of the meeting, "Forward with Confidence," was presented by Maryland RCC operator Boyd King, convention host, in a welcoming address. ■■■

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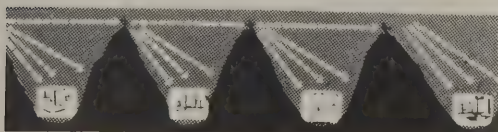


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—Please send free reprint of FCC rules covering translators.

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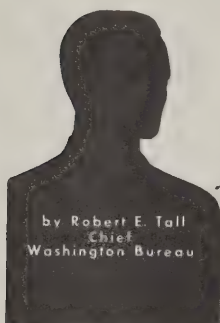
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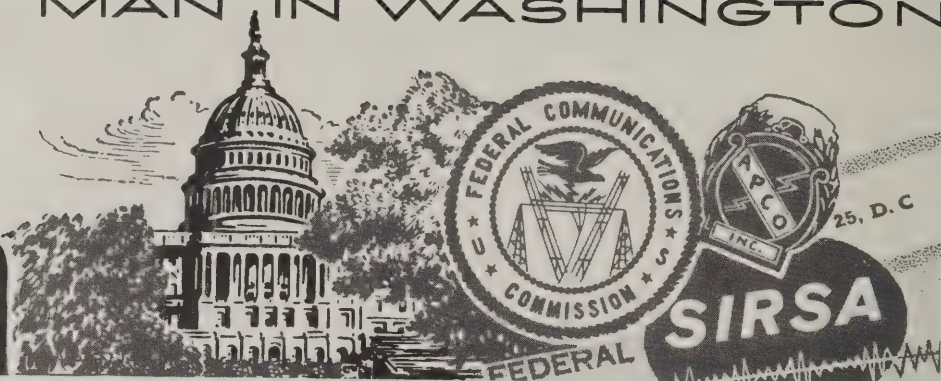
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OUR MAN IN WASHINGTON



by Robert E. Tall
Chief
Washington Bureau



ANOTHER CHANNEL SPLIT PROPOSED

The Federal Communications Commission has proposed channel splitting for the 72-76 Mc band in a continuation of its program to gain more assignable frequencies.

Comments are asked on the proposed rule-making, which would reduce the authorized channel bandwidth from 40 to 20 Kc and thus provide 38 new assignments for operational fixed stations. Deadline for comments is November 5.

As with earlier channel-split proposals, the Commission plans to reduce allowable frequency deviation from plus or minus 15 Kc to plus or minus 5 Kc.

Under the proposal, the 78 channels which would result between 72 and 76 Mc would be available to operational fixed stations in the aviation, public safety, industrial, marine, and land transportation radio services, as well as to fixed stations in the domestic public radio services, subject to present restrictions for the protection of television channels 4 and 5.

NATIONAL MOBILE DIRECTORY BEING PREPARED FOR ISSUE

A national mobile telephone service area directory is being prepared. The volume is planned to list all Bell System and Independent telephone company stations which offer domestic public land mobile radio service.

Intended to be distributed by telephone companies to mobile subscribers, the directory will list mobile service areas by state and city, indicating radio channels available and showing the company providing the service. Channels will be indicated by a two-letter code.

CHICAGO SYSTEM ASKS TRANSIT CHANNEL

The Chicago Transit Authority has joined the group of transit system interests advocating the allocation of an 80-kilocycle channel in the 30.85-31.17 Mc area for exclusive use by urban transit systems in automatic train control operations.

The CTA request was included in the Authority's comments on FCC Docket 14503 (service-allocation of split channels in the 25-42 Mc band).

ORAL ARGUMENT SET IN COLORADO MICROWAVE CASE

Oral argument before the FCC Commissioners concerning common carrier microwave applications of Radio Specialists Co., Denver, Colorado, has been scheduled for Monday, November 5.

The Denver firm has applied for a system between the Denver and Colorado Springs areas to provide audio and control communications circuits for use by private mobile radio systems. FCC Hearing Examiner Millard F. French earlier issued an initial decision looking toward denying the application.

Radio Specialists' applications are being opposed by the Mountain States Telephone & Telegraph Co., and the Eastern Slope Rural Telephone Association.

EIA FORMS FREQUENCY COMMITTEE

A frequency allocations coordinating committee has been established within the EIA under the chairmanship of Frederick R. Lack, director of the EIA engineering department.

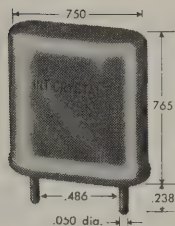
Purpose of the committee is to reconcile view points of various EIA groups regarding recommendations to the FCC and other federal agencies. Its formation, said an EIA spokesman, "is in line with efforts to broaden the association's membership base to include a wide variety of interests without loss of group identity."

ITT SUBSIDIARY FOR RCC OPERATION ANNOUNCED

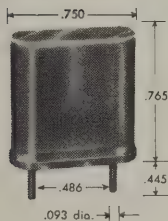
The International Telephone and Telegraph Co. has formally announced the formation of a new subsidiary corporation, ITT Mobiltele, Inc. to be "engaged primarily in the operation of radio common carriers."

Custom made

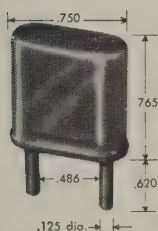
CRYSTALS



F-605



F-609



F-612

FREQUENCIES 70 KC TO 137 MC

DESCRIPTION AND DATA:

All of these crystals are of the plated, wire-mounted type. Low drift AT-cut blanks are used in these units above 500 KC, and low drift DT and CT-cut blanks are used in units below 500 KC; any crystal can be supplied for operation with or without an oven.

TEMPERATURE TOLERANCE:

AT— $\pm .005\%$ from -55° to $+90^{\circ}\text{C}$.
 $\pm .002\%$ from -30° to $+60^{\circ}\text{C}$.
 DT-CT— $\pm .01\%$ from -40° to $+70^{\circ}\text{C}$.

CALIBRATION TOLERANCE:

Supplied to meet equipment manufacturers specifications and may be as close as .001% without oven or .0005% with oven. Where no equipment is specified the following will apply.

AT— .0025% of nominal at $+30^{\circ}\text{C}$.
 DT-CT— .01% of nominal at $+30^{\circ}\text{C}$.

DRIVE LEVELS:

Maximum, AT—
 10 milliwatts 500 KC to 999 KC
 4 milliwatts 10,000 KC to 24,000 KC
 2 milliwatts 25 MC to 137 MC
 DT-CT—2 milliwatts

CIRCUIT: As specified by customer. Crystals are available for all major two-way equipment and in most cases the necessary correlation data is on file. Where circuit is not specified, the crystal will be calibrated for operation into a load capacitance of 32 mmf.

FREQUENCY RANGES AND MODES OF OPERATION

200-500 KC:

Operates on fundamental edge shear oscillation. Load capacitance 32 mmf . . . or as specified by customer. If load is not known specify circuit or equipment in which crystal will be used.

500-20,000 KC:

Operates on fundamental face shear oscillation. Load capacitance 32 mmf . . . or as specified by customer.

10-60 MC:

Operates on third mechanical overtone at anti-resonance. Will give reasonable output in tuned circuit.

60-100 MC:

Operates on fifth (or seventh) mechanical overtone at series-resonance. Drive level must be kept below 2 milliwatts.

ONE DAY SERVICE

Orders for less than five crystals are shipped within one working day following receipt of order (except low frequency and special crystals which require 10 to 30 days for processing). Orders received on Mon. thru Thurs. will be shipped the day following. Orders received on Fri. will be shipped the following Mon. Postage is prepaid within continental U.S. when cash accompanies order. All others are shipped F.O.B. Oklahoma City.

SUPPLY THIS INFORMATION WHEN ORDERING

MOTOROLA: Crystals can only be properly correlated for Motorola equipment if the crystal type number is given. Example: D02, R28, D03, etc. In cases where crystals are required for type D-14, 800 and 801 holders, always specify crystal frequency or the high IF frequency. Check whether the crystals are to be used in ovens.

GENERAL ELECTRIC: Specify model number of transmitter and receiver RF Decks. Example: 4ES13A3, 4ER24B1, 4ET5B3, etc. When ordering crystals for 450 MC equipment specify:

Receiver Crystals:

- If they are heated or non-heated.
- If the unit is AFC or NON-AFC Controlled.
- Platter number of present receiver deck.

Transmitter Crystals:

- If they are heated or non-heated.

R.C.A.: Specify model number of unit or MI Number of the crystal. Always indicate whether crystals are to be non-heated or heated type.

OTHERS: Specify model number of the receiver and transmitter as well as any formulae that pertain to the correct crystal calculation.

PRICES — F-605, F-609, F-612 CRYSTALS

Fundamental KC		Fundamental KC		Overtone MC	
200 - 499*	\$12.50	3000 - 3999	\$5.75	10 - 34.99	\$ 6.50
500 - 849*	15.00	4000 - 5999	5.00	35 - 44.99	7.00
850 - 899*	13.50	6000 - 9499	4.50	45 - 60	8.50
900 - 999*	12.50	9500 - 10999	5.00	61 - 75	10.50
1000 - 1499†	9.80	11000 - 14999	6.30	76 - 137	15.00
1500 - 1999†	7.50	15000 - 20000	8.00		
2000 - 2999	6.50				

*Allow 10 to 30 days for processing.

†Allow 2 to 3 days for processing.

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Initial plans for the concern, a California corporation, include the acquisition and operation of five RCC locations in California and to expand this activity later to other areas.

SIRSA SECRETARY RESIGNS

G. Kenneth Adams has resigned as executive secretary of the Special Industries Radio Service Association, to become affiliated with another association. His successor is expected to be named shortly.

SECOND HIGHWAY CALL SYSTEM UNDERGOING TESTING

A second system of highway emergency calling by radio—differing in several significant details from the California system described here in September—is undergoing field evaluation on the Garden State Parkway in New Jersey.

The eastern system, developed by IIT Kellogg Communications Systems Division and designated "Turn Call", employs a hand crank generator to both provide power and actuate the call.

Unlike the California system, which is to be operated only by police officers, "Turn Call" may be operated by a motorist in need of assistance. Information identifying the particular transmitter and type of message is digitally encoded. When the motorist turns the crank, the

transmitter is keyed, producing about 3 watts output into a directional antenna. Receiving equipment at the communications center decodes the message, and appropriate help may then be dispatched to the motorist sending the signal.

At present, 10 units are in use. Frequency is 159.46 Mc. Emission is 6F3.

450 Mc RULE WAIVER PROVISION INCLUDED IN NEW RULE CHANGE

The FCC has added a footnote to Part 21 of its Rules and Regulations providing that, in individual cases, the 450 Mc frequencies allocated for radio common carrier use may be used for control and repeater stations located within 50 airline miles of an urban area with population greater than 300,000.

To qualify for such a waiver, the RCC must show "such engineering proof as may be necessary" that all of the currently assignable frequency pairs in the 152-162 Mc region are not in present or immediate future need, and that "the growth of the public land mobile radio service has not been hampered and is not likely to be hampered" by a shortage of frequencies in the 152-162 Mc region in the area.

Assignments obtained by such a waiver will be on a secondary basis, subject to withdrawal on 60-day notice should the channels be needed for mobile use in the area.

Petition . . . from p. 6

Channels 14 and 15 are presently being very sparsely used in the United States, with only three stations in operation on Channel 14 and five in operation on Channel 15. A change as proposed here would involve a minimum of shifting. Because adequate time for moving to a new channel must be allowed the TV broadcaster, it is imperative that proper rule-making be accomplished now. It is also timely that this issue be determined now so that "all channel" TV receivers which will be on the market in the next few years may be properly designed so as not to include these channels. It is proposed that in the interim period before the frequency shift of the existing users, the use of Channel 14 and 15 frequencies by the Land Mobile Radio Services be allowed in those areas which do not contain such a TV broadcasting station. No mobile systems would be permitted to operate within a reasonable distance of any existing Channel 14 or 15 TV Transmitter, based on sound engineering practice, thereby affording the existing TV viewers necessary interference protection.

It is not difficult to assess the tremendous public interest and benefit that accrues from over 1,700,000 private land mobile transmitters authorized today. With the sustained projected growth, the public

interest will only continue to be served if additional frequency spectrum is allocated for these land mobile radio services.

Respectfully submitted,
William J. Weisz
William J. Weisz, Chairman
Land Mobile Communications Section
Industrial Electronics Division
Electronic Industries Association

John B. Olverson
John B. Olverson
General Counsel
Electronic Industries Association

Splatter . . . from p. 1

dropped in a local newscast — and the result will be public support!

Maybe all this sounds like too much work, and you're busy. Sure it's work, and we're all short of time. But the question really is, "Do we really want this space?" If we do, we'll *have* to work.
—jk

NEXT MONTH

MRS MOBILE RELAYS



TINY BASE STATION

A low-cost base station requiring only 13 inches of space on a dispatcher's desk has been announced by *General Electric's* Communication Products Department, Lynchburg, Va.

Half the size of previous table-model dispatch stations, the compact unit is designed for small businesses, large factories and institutions, and governmental agencies.

Now in production, the new unit features 15-watt power output and operates in either low-band (27-50 Mc) or high-band (150-174 Mc) systems. It meets all FCC technical requirements, including those for NBFM. Size is 4½ inches high by 13 inches wide by 13 inches deep.

For complete specifications and data, write Kent J. Worthen, Section P, General Electric Communication Products Department, P. O. Box 4197, Lynchburg, Va.

NOISE-CANCELLING MICROPHONE

A noise-cancelling microphone especially developed for mobile use has been announced by *Shure Brothers, Inc.*, 222 Hartley Avenue, Evanston, Illinois.

Designated the Model 488 "Sono-Bar", the new mike uses the Shure "controlled reluctance" cartridge and is said to outperform "all" other noise-cancelling mikes in lab and field tests.

Three versions are available, in high impedance, low impedance, and transistorized

models. The transistorized model is FAA certified for aircraft applications. For full specs and data, write Shure.

IGNITION SHIELDING SYSTEM

A "sound shroud" that halts radio interference at its source in marine and automotive engines has been introduced by *Webster Manufacturing*, 317 Roebling Road, South San Francisco, California.

The system consists of complete shielding for the ignition system, to wrap an "insulating barrier" around the noise-producing ignition complex. Fully assembled and ready to install systems are available for several makes of marine engines and for 8-cylinder Ford, Chrysler, and General Motors vehicles at suggested list prices ranging from \$115 to \$129.50.

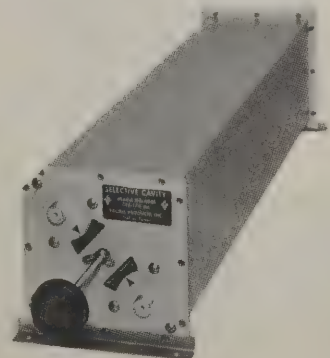
Marketing will be through marine electronics dealers, automotive parts distributors, and electronics parts houses. For further data contact James R. Adams at Webster and say we sent you.

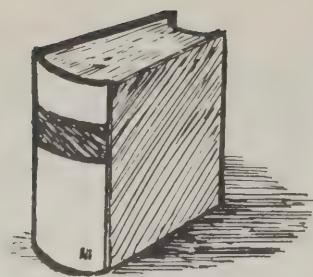
HI-BAND, UHF CAVITY FILTERS

A new line of cavity filters for the 150 Mc and 450 Mc bands has been announced by *Decibel Products, Inc.*, 3184 Quebec Street, Dallas 7, Texas.

Featuring adjustable coupling loops that permit the user to obtain optimum combinations of selectivity and insertion loss for any particular application, the cavities are constructed of silver plated copper. Frequency stability is maintained through use of a threaded Invar tuning rod.

Designated as the DB-4001 series for 150 Mc and DB-4021 series for 450 Mc, the cavities are available in either single-cavity modules or in combinations of two or three. For additional details, write Fred McDaniel, db Sales Manager.





LOGBOOK

A CALENDAR OF IMPORTANT MEETINGS AND
EVENTS OF INTEREST TO MOBILE COMMUNICATIONS.

Submit items for this column to CH Washington Bureau Chief,
ROBERT E. TALL at 1327 F STREET N.W., WASHINGTON 5, D.C.

Oct. 18—Meeting of radio user organizations and EIA representatives in Washington to discuss petition to the FCC requesting reallocation of TV channels 14 and 15 for land mobile communications.

Oct. 19—Annual meeting of the Committee on Manufacturers Radio Use at the Sheraton-Carlton Hotel in Washington.

Oct. 23-25—Annual meeting of Communications & Signal Section of Association of American Railroads Sheraton-Chicago Hotel, Chicago, Ill.

Oct. 25—Meeting of Public Safety Communications Council in Chicago.

Nov. 5—Deadline for comments on FCC proposals to split channels in the 72-76 megacycle band (Docket 14785).

Nov. 9—Oral argument before the FCC on a March 22 examiner's initial decision which looks toward denying common carrier microwave applications of Radio Specialist Co., of Denver, Colo., which

Nov. 5-6—Annual meeting of Executive Committee of Forest Industries Radio Communications. Dallas, Tex.

Nov. 30—Deadline for reply comments on FCC proposals to service-allocate mobile radio split channels in the 25-42 Mc band and make revisions in present assignment of frequencies in the band (Docket 14503).

Dec. 6-7—13th National Conference of Institute of Radio Engineers Professional Group on Vehicular Communications. Anaheim, Calif.

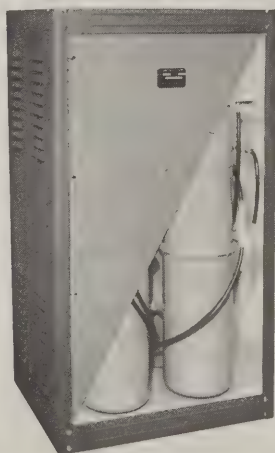
Jan. 1, 1963—Date when new revised FCC Form 505 must be used for Class B, C, or D Citizens radio applications.

Jan. 1, 1963—Effective date of merger of Institute of Radio Engineers and American Institute of Electrical Engineers into new Institute of Electrical & Electronic Engineers.

Oct. 31, 1963—Mobile radio users must meet full narrow band technical standards of FCC.

Nov. 1, 1963—Fire radio systems must move off frequencies allocated to the police radio service.

DUPLEX with only 0.5 Mc. Separation



THE SINCLAIR F-150-4E DUPLEXER
SPECIFICATIONS

Frequency Range	150 to 174 Mc.
Isolation	110 db @ 0.5 Mc. 120 db @ 0.6 Mc.
Insertion Loss	Adjustable from 1.0 db to 1.8 db
Power Rating	250 Watts

WITH THE UNIQUE SINCLAIR F-150-4E DUPLEXER

● Perfectly suited for base station or repeater station use in the crowded 150 Mc. Band, the F-150-4E Duplexer combines high isolation between transmitter and receiver for either dual simplex or full duplex operation with an extremely low 0.5 Mc. separation. *The only duplexer known today to offer this high degree of isolation with such low separation.*

● Inherent temperature compensation and many other high quality construction features are built into the Sinclair F-150-4E Duplexer . . . insuring years of maintenance-free operation.

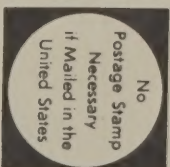
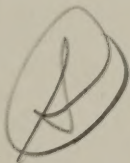
● The low initial cost of the F-150-4E can easily reduce the cost of communications in the 150 Mc. Band by as much as 95%. For more information concerning the F-150-4E Duplexer, as well as all Sinclair Duplexers, write for Bulletin 62-DU-4.

*Selected Sales Territories still available —
contact J. E. Onofrio for details.*

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FOR ACCURACY EXCEEDING FCC REQUIREMENTS

**SEND FOR
THE LATEST
INFORMATION ON
THESE TWO
OUTSTANDING
METERS...**

Dear Sir:

Please send detailed information on:

- ☐ Du Mont FAIRCO MARK III Frequency Meter.
- ☐ Du Mont transistorized "FREQ" meter, Type 4980-B.
- ☐ Du Mont 2-way Radio Communications Systems.

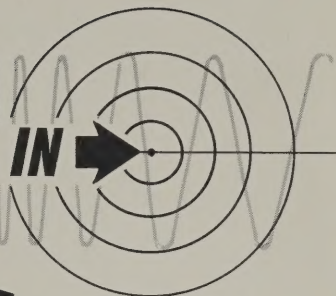
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NEW! DU MONT

FAIRCO

**MARK III
FREQUENCY METER**

... a portable, low-cost, simply operated secondary frequency standard with accuracy exceeding FCC requirements! With one small unit you can now measure every frequency in the allocated FM spectrum—in central operations or in the field. A single cable connection allows exact adjustments of both transmitter and receiver in a matter of seconds. Settings are quickly and simply made for performance without error. A new "must" tool for 2-Way Radio service firms from the pioneer of communications. Write for details.

FEATURES

- Low price.
- Accuracy exceeding FCC requirements.
- Satisfies all allocated frequencies in FM band.
- Operates on 110 VAC, plus 6 or 12 VDC inverter.
- All circuits locked to a single temperature crystal standardized against WWV.

Price \$650.00

the servicing do-all

TRANSISTORIZED "FREQ" METER

FEATURES

- 24 r-f/i-f channels and an audio signal in one, pint-sized package.
- 25 to 470 Mc spectrum plus i-f channels in the 100 kc to 100 Mc range.
- Defies obsolescence—permits addition of new channels.
- Signal generator output for receiver servicing.
- Checks adjacent—or split-channel gear with excellent precision.
- Compact, transistorized, long-life battery powered—requires no a-c connection.

The most versatile servicing tool in the industry—now a standard. Lightweight—8 pounds, rugged construction for portability. The ideal Freq Meter to perform functions such as: Carrier frequency error indication, relative transmitter field strength, modulation deviation measurement, receiver r-f alignment generator, aural monitor of modulated signal and many others. Write for details.

Price \$435 with one RF Crystal



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**DU MONT REPRESENTATION FROM
COAST TO COAST**

NEW...A Superior "Years Ahead Design"

150-174MC FM TRANSCEIVER

That Costs Less!

General **FM-60**

For New Split Channel Requirements



The FM-60 Business Band Transceiver is the most competitive set available. The FM-60 now meets the complex demands placed upon modern business. This compact, rugged unit surpasses in quality, price and inclusive features any FM transceiver in operation today.

THE FM-60 is 60% efficient. This power ratio is unequalled in today's market.

THE FM-60, at \$349.95, is up to 40% lower than competitive makes.

THE FM-60 has inclusive features that make for trouble-free, flexible two-way radio... hermetically sealed relays, nuvistor front end, fully automatic squelch, narrow band reception. Constructed for 6-12 or 115 volt input by merely changing the power cord. Handles are built-in to provide easy transport.

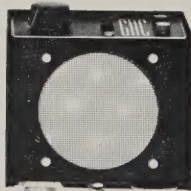
MODEL RC-612 REMOTE CONTROL. The remote control, Model RC-612, is capable of controlling all functions of the FM-60, and contains a speaker; volume control with on-off switch; squelch control; battery saver switch, transmit and receive indicator lights; receptacle for microphone; 12 conductor remote cable with plug attached; mounting bracket.

Standard cable length is 17 feet, any length available on special order. **\$49.95 NET**

HEIGHT: 1 13/16"

WIDTH: 4 1/8"

DEPTH: 4 1/4"



HIGHLIGHT SPECIFICATIONS: RECEIVER: Frequency Range: 150-174MC • Frequency Stability: .0005% temperature controlled • Squelch Sensitivity: 2uv or less • Attenuation of Spurious Response: Greater than 60 db • Receiver Sensitivity: .5 uv for 20db noise quieting • Intermediate Frequencies: 1st I.F. 11 MC 2nd I. F. 455KC • R.F. Amplifier: 6BS8 • 1st Mixer: 6CW4 • 1st and 2nd Oscillator: 6EA8 • 1st 455 KC I.F. Amplifier: 6BH6 • 2nd 455 KC I.F. Amplifier: 6BH6 • Limiter and Detector: 6BN6 • 1st Audio: 1/2 6EB8 • Audio Amplifier: 1/2 6EB8 • Noise Amplifier: 1/2 6AW8 • TRANSMITTER: Frequency Stability: .0005% temperature controlled • Spurious and Harmonic Attenuation: Greater than 45 plus 10 Log 10 • R.F. Output Impedance: 50-74 ohms • R.F. Power output: 15 watts into 50 ohms • Modulation: FM (phase modulation) with direct crystal control. Type F3 emission • Modulation limiter: Automatic peak limiting • Modulation deviation: Narrow band (±5 KC) adjustable • Final amplifier: 6360 • 3rd Frequency multiplier: 1/2 6360 • 2nd Frequency multiplier: 1/2 6360 • 1st Frequency multiplier: 1/2 6EA8 • Crystal Oscillator: 1/2 6EA8 • Phase Modulator: 6BH6 • Microphone preamplifier: 1/2 6AW8. **POWER SUPPLY:** Input voltages: 6 or 12 volts DC or 117 volts AC • Receive: 6V/9.4A, 12V/4.7A, 117V/60W • Transmit: 6V/16A, 12V/8A, 117V/100W • Duty cycle: Continuous, receive or transmit. **SIZE:** 4 1/2 H x 8 1/8 W x 10 1/2 D. • Quick change "Snap-Rak" for instantaneous removal, optional. FCC type accepted, parts 10, 11, 16, 21, and certified under part 15.

The GENERAL FM-60, "Years Ahead Design," meets the recommended specifications established by the U.S. Government. It will exceed your expectations of what a trouble-free, reliable, low-cost FM Communications system can be. See for yourself!

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